

# Transcranial Magnetic Stimulation (TMS)



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Transcranial Magnetic Stimulation (TMS) is a relatively new treatment for Major Depression that is being investigated by a number of scientists across the world. At the current time, the FDA has only officially cleared TMS for a single indication: treatment-resistant depression. TMS, as a generic procedure, has not been approved by the FDA. Rather, a specific device that performs TMS, the *NeuroStar*, was cleared by the FDA in Oct. 2008 for clinical use in treatment-resistant depression.

TMS is an outpatient intervention which could be an option for individuals diagnosed with major depression who have not responded to trials of antidepressant medications at an adequate dose and duration. In clinical trials, individuals had been treated with an average of five medication treatment attempts, one of which was at an adequate dose and duration. TMS has not been thoroughly studied for people who have failed two or more adequate trials of antidepressants or for people who have not been on antidepressants. TMS is not indicated for individuals who have bipolar disorder, depression with psychosis or individuals with a high risk of suicide.

Each session of TMS consists of a session lasting approximately 40 minutes conducted in an outpatient office using a specific technology. The procedure, given daily, occurs over a four-to-six-week period. The TMS device sends magnetic pulses to the frontal left side of the brain which generates weak electrical currents. These magnetic pulses are similar to what one would experience in getting a magnetic resonance image (MRI) of their brain.

The theory of the treatment is that the resulting electrical currents activate neurotransmitters implicated in the symptoms of depression—serotonin, norepinephrine and dopamine. Studies have shown that the frontal left side of the brain is an area that can be underactive in individuals with major depression, hence the rationale for the site of the stimulation.

In a randomized, controlled clinical trial with individuals who had not adequately benefited from prior antidepressant medication, patients treated with TMS experienced a significantly greater improvement in symptoms than patients treated with placebo. In an open-label trial, which is most like real-world clinical practice, 54 percent of individuals treated with TMS experienced a significant improvement in symptoms. While these studies suggest that TMS may be quite beneficial, other studies have suggested otherwise—that TMS may not have a substantial benefit as opposed to placebo treatment.

TMS requires no anesthesia or sedation, has a low rate (about 5 percent) of discontinuation due to adverse effects (most commonly headache) and has no systemic side effects—as opposed to oral antidepressant therapy which can be associated with sexual side effects, weight gain, nausea, constipation or dry mouth. Medical devices such as pacemakers or metal objects in one's head prevent the use of TMS. Seizure risk can be raised by TMS yet TMS has not been frequently shown to cause seizures in individuals without an underlying seizure disorder. As this is a newer treatment, there are no long-term studies of the effects of TMS. Another important consideration is that TMS may not be covered by medical insurance in some cases and can be expensive if coverage is not part of the health plan.

Like all new treatments, doctors are still sorting out best uses for TMS as well as its potential downsides. At this time, there is no evidence to support the use of “maintenance treatment” with TMS once the initial episode of treatment is over. Researchers and doctors are also trying to better assess when and if TMS can be an alternative to electroconvulsive therapy (ECT) which has more treatment intensity and side effects. It is safe to say we have more to learn about this intervention. Academic medical centers are most familiar with this intervention and may conduct research studies on TMS. Individuals interested in this—or any other new treatment—are encouraged to review any emerging information from research and clinical practice with their doctors.

*NAMI; Reviewed by Ken Duckworth, M.D., and Jacob Freedman, M.D., August 2012; Updated April 2017*